

What is claimed is:

1. A system for detecting failure of manufacturing apparatuses, comprising:

5        a low-yield detecting portion which identifies a low-yield-period apparatus having a significantly lower yield period compared with other manufacturing apparatus and the significantly lower yield period by comparing yields of a plurality of manufacturing  
10      apparatuses used in parallel in a specific manufacturing process for each time period when the manufacturing apparatuses were used;

15      a downward-tendency detecting portion which identifies a downward-tendency apparatus having a significant downward tendency in yield compared with the other manufacturing apparatus by comparing recent yield trends of the plurality of manufacturing apparatuses;

20      a warning issuing portion which issues multi-level warnings to the low-yield-period apparatus and the downward-tendency apparatus; and

25      a yield data storing portion which stores yield data of the plurality of manufacturing apparatuses for each time period when the manufacturing apparatuses were used.

2. The system of claim 1, wherein the low-yield detecting portion comprises:

a parallel-period detecting portion which detects a time period when the plurality of manufacturing apparatuses were used in parallel;

a yield threshold determining portion which detects one of the manufacturing apparatuses having a low yield period when yields are lower than a yield threshold value and the low yield period; and

10 a low-yield identifying portion which identifies one of the manufacturing apparatuses having a significant difference in yield from the other manufacturing apparatus during the low yield period as the low-yield-period apparatus, and identifies the low yield period as being the significantly lower yield period.

3. The system of claim 2, wherein the yield threshold determining portion comprises:

20 a good/defective determining portion which determines whether a group of processed objects is good or defective by comparing a yield of a group of objects processed by one of the manufacturing apparatuses with the yield threshold value; and

25 a consecutive-fail determining portion which identifies a certain period as being the low yield period when a plurality of groups of the processed objects are

determined to be substantially consecutively defective for the certain period.

4. The system of claim 2, wherein the low-yield identifying portion determines whether or not only one of the manufacturing apparatuses is a low-yield-period apparatus during the significantly lower yield period.

5. The system of claim 1, wherein the downward-tendency detecting portion comprises:

a trend threshold determining portion which detects one of the manufacturing apparatuses which has a downward tendency in recent yield trend compared with a yield-trend threshold value; and

15 a downward-tendency identifying portion which identifies one of the manufacturing apparatuses which has a significant difference in recent yield trend from the other manufacturing apparatus as the downward-tendency apparatus.

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6. The system of claim 1, wherein the warning issuing portion issues the warnings of levels depending on whether or not the significantly lower yield period of the low-yield-period apparatus is currently continuing, and 25 whether or not the low-yield-period apparatus has a significant downward tendency in yield compared with

the other manufacturing apparatus.

7. The system of claim 1, further comprising:
  - an event/operation condition examining portion
  - 5 which examines whether or not maintenance, inspection, repair or component replacement was performed on the low-yield-period apparatus and whether or not operating conditions for the low-yield-period apparatus have been changed before and after the significantly lower yield
  - 10 period identified by the low-yield detecting portion;
  - a cause estimating portion which estimates a cause of low yield in the low-yield-period apparatus based on results of the examining; and
  - an event/operation condition storing portion which
  - 15 stores history of maintenance, inspection, repair and component replacement performed on the manufacturing apparatuses and history of changes of operating conditions for the manufacturing apparatuses.
- 20 8. The system of claim 1, wherein the yield data includes at least one of a good product rate of finished products having experienced a series of manufacturing processes including the specific manufacturing process, a good product rate in the specific manufacturing process, a characteristic quantity representing in number a distribution of defectives in a wafer surface of

a semiconductor wafer processed by one of the manufacturing apparatuses as a processed object, and a characteristic quantity representing in number a distribution of yields in one lot of a group of objects processed by one of the manufacturing apparatuses.

9. A method of detecting failure of manufacturing apparatuses comprising:

identifying a low-yield-period apparatus having a significantly lower yield period compared with other manufacturing apparatus and the significantly lower yield period by comparing yields of a plurality of manufacturing apparatuses used in parallel in a specific manufacturing process for each time period when the manufacturing apparatuses were used;

identifying a downward-tendency apparatus having a significant downward tendency in yield compared with the other manufacturing apparatus by comparing recent yield trends of the plurality of manufacturing apparatuses; and

issuing multi-level warnings to the low-yield-period apparatus and the downward-tendency apparatus.

25 10. The method of claim 9, wherein identifying the low-yield-period apparatus and the significantly lower

yield period comprises:

detecting a time period when the plurality of manufacturing apparatuses were used in parallel;

detecting one of the manufacturing apparatuses  
5 having a low yield period when yields are lower than a yield threshold value and the low yield period; and

identifying one of the manufacturing apparatuses having a significant difference in yield from the other manufacturing apparatus during the low yield period as  
10 the low-yield-period apparatus, and identifying the low yield period as being the significantly lower yield period.

11. The method of claim 10, wherein detecting one of  
15 the manufacturing apparatuses having a low yield period when yields are lower than a yield threshold value and the low yield period comprises:

determining whether a group of processed objects is good or defective by comparing a yield of a group of  
20 objects processed by one of the manufacturing apparatuses with the yield threshold value;; and

identifying a certain period as being the low yield period when a plurality of groups of the processed objects are determined to be substantially consecutively  
25 defective for the certain period.

12. The method of claim 9, wherein identifying the downward-tendency apparatus comprises:

detecting one of the manufacturing apparatuses which has a downward tendency in recent yield trend  
5 compared with a yield-trend threshold value; and

identifying one of the manufacturing apparatuses which has a significant difference in recent yield trend from the other manufacturing apparatus as the downward-tendency apparatus.

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13. The method of claim 9, wherein the warnings are issued in levels depending on whether or not the significantly lower yield period of the low-yield-period apparatus is currently continuing, and whether or not  
15 the low-yield-period apparatus has a significant downward tendency in yield compared with the other manufacturing apparatus.

14. The method of claim 9, further comprising:  
20 examining whether or not maintenance, inspection, repair or component replacement was performed on the low-yield-period apparatus and whether or not operating conditions for the low-yield-period apparatus have been changed before and after the significantly lower yield  
25 period identified by the low-yield detecting portion; and estimating a cause of low yield in the

low-yield-period apparatus based on results of the examining.

15. A computer program product for detecting failure  
5 of manufacturing apparatuses comprising:

an instruction configured to identify a low-yield-period apparatus having a significantly lower yield period compared with other manufacturing apparatus and the significantly lower yield period by  
10 comparing yields of a plurality of manufacturing apparatuses used in parallel in a specific manufacturing process for each time period when the manufacturing apparatuses were used;

15 an instruction configured to identify a downward-tendency apparatus having a significant downward tendency in yield compared with the other manufacturing apparatus by comparing recent yield trends of the plurality of manufacturing apparatuses; and

20 an instruction configured to issue multi-level warnings to the low-yield-period apparatus and the downward-tendency apparatus.

16. The computer program product of claim 15, wherein  
25 the instruction configured to identify the low-yield-period apparatus and the significantly lower

yield period comprises:

an instruction configured to detect a time period when the plurality of manufacturing apparatuses were used in parallel;

5       an instruction configured to detect one of the manufacturing apparatuses having a low yield period when yields are lower than a yield threshold value and the low yield period; and

10      an instruction configured to identify one of the manufacturing apparatuses having a significant difference in yield from the other manufacturing apparatus during the low yield period as the low-yield-period apparatus, and identify the low yield period as being the significantly lower yield period.

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17. The computer program product of claim 16, wherein the instruction configured to detect one of the manufacturing apparatuses having a low yield period when yields are lower than a yield threshold value and the low yield period comprises:

20      an instruction configured to determine whether a group of processed objects is good or defective by comparing a yield of a group of objects processed by one of the manufacturing apparatuses with the yield threshold value; and

25      an instruction configured to identify a certain

period as being the low yield period when a plurality of groups of the processed objects are determined to be substantially consecutively defective for the certain period.

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18. The computer program product of claim 15, wherein the instruction configured to identify the downward-tendency apparatus comprises:

an instruction configured to detect one of the manufacturing apparatuses which has a downward tendency in recent yield trend compared with a yield-trend threshold value; and

an instruction configured to identify one of the manufacturing apparatuses which has a significant difference in recent yield trend from the other manufacturing apparatus as the downward-tendency apparatus.

19. The computer program product of claim 15, wherein the warnings are issued in levels depending on whether or not the significantly lower yield period of the low-yield-period apparatus is currently continuing, and whether or not the low-yield-period apparatus has a significant downward tendency in yield compared with the other manufacturing apparatus.

20. The computer program product of claim 15, further comprising:

an instruction configured to examine whether or not maintenance, inspection, repair or component 5 replacement was performed on the low-yield-period apparatus and whether or not operating conditions for the low-yield-period apparatus have been changed before and after the significantly lower yield period identified by the low-yield detecting portion; and

10 an instruction configured to estimate a cause of low yield in the low-yield-period apparatus based on results of the examining.